C00021953

7 September 1971

MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report -
Personnel Incapacitation Contract Status

1. This contract was scheduled to terminate 31 October 1971. However, as of 31 July only 25% of the funds had been expended as compared with a projected 75% expenditure. The Project Officer had been made aware of this situation as it was a consequence of assigned personnel being engaged in the completion of other high priority Agency tasks. In as much as the Division had no funds for extending the project or initiating follow-on tasks, it did not seem appropriate to insist that the contractor maintain his planned schedule. A no-cost extension until 30 April 1972 has been requested and approved.

2. The essential purpose of the visit was to structure definitive plans for continuation of the project. The principal investigator and his collegues had outlined several alternative approaches for discussion with the Project Officer. These included, but were not limited to:

a. Extensive library search along with consultant assistance to provide an extensive annotated bibliography in the area of personnel incapacitation.

b. Establishment of Consultant Workshops and Ad Hoc Committees to evaluate present and hopefully generate new concepts of personnel incapacitation.

c. On the basis of available information, to structure psychological and physiological continua of incapacitation from alertness to death. The concept is similar to that of the anesthesiologist's "planes of consciousness."

d. A detailed study of a single family of incapacitation methods, i.e., Impact, Chemical, Sensory Overload, etc.

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Personnel Incapacitation Contract Status

3. On the basis of extended discussions, mutual agreement was reached on the following plan of action; minimum effort (10%) will be devoted to continuing aquisition and review of new documents. The contractor will continue to remain alert to new concepts of personnel incapacitation. To date the only new possibilities not previously considered by others in this area are:

a. Use of [redacted] as a tasteless, odorless, incapacitating gas not requiring an antidote or leaving body traces. [redacted] personnel are completely familiar with the use of [redacted] data from submarine and space habitability studies, industrial medicine and other sources. However, [redacted] has not been considered in terms of our personnel incapacitation requirements. Recognizing the necessity for closed space application, the scenarios for which controlled concentrations of [redacted] would be applicable are quite limited.

b. The second "new" concept, in terms of utilization for temporary personnel incapacitation, is the use of [redacted] as a vehicle for transmission of incapacitating chemical agents through the skin. The contractor is completely aware of previous unclassified research in this area.. In fact, [redacted] is doing other work for the Agency in the area of toxicology, for which I do not have a "need to know." It is quite possible that certain of the contractor personnel are aware of previous classified research in the area. [redacted] assigned to this project, has worked extensively with [redacted] and should have the background to rapidly determine it's applicability for our requirements.

4. It was mutually agreed that if a first appraisal of these two concepts indicates low probability of success, work would be discontinued regarding [redacted] Perhaps, in the course of continuing effort under this contract they will generate other possibilities. Parenthetically, one of the reasons for letting the initial contract with the [redacted] was the hope that an organization with a medical orientation, looking at the problem from the man to the agent rather than from the agent or hardware to the man, could generate concepts not previously considered. However, as indicated in the previous trip report [redacted] dated 18 May 1971) "both they and the Project Officer are aware that a gamble on new ideas is a high risk investment."

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5. The third and perhaps most significant area of effort, assuming the contractor does not generate a major breakthrough with a new concept, is a systems analysis of potential incapacitation methods. The contractor will conduct a systems analysis of energy sources, i.e., impact, light, sound, electric current, chemical and others in terms of physical aspects of the agent, delivery system, physiological and medical considerations, applications and limitations, and recommendations. Emphasis will be placed upon the physiological and medical aspects as opposed to delivery systems and operational factors. A plan for a systems analysis of visual incapacitation was generated by this office and for which [redacted] have submitted a written requirement to implement. (Attachment I). The contractor will utilize this document as a guideline for his systems analysis effort.

6. In spite of extensive thought and experimentation by competent authorities, none have defined an efficient non-lethal weapon system. Perhaps, in the course of their work [redacted] will do so. However, if this does not materialize they should still meet the essential requirements of their contract, which as stated in the Bluebook, "this project will organize available data in a matrix fashion so that at any given time one could determine the specific research parameters necessary to fill in the gaps to provide required systems . . . to provide a data bank of information concerning the physiological effect of energy sources as these may be appropriate to the development of long range systems." The philosophy is identical to that expressed in Attachment I. I feel the contractor will satisfactorily meet the contract requirements within the extended time span.

[redacted]

ATTACHMENT 1

Rationale for Visual Impairment Systems Analysis

Most military and civil law enforcement operations are dependent upon normal functioning of the human visual system. This fact applies to both military and civil offensive operations as well as protection or countermeasures against the use of light energy by hostile forces.

A brief review of light energy utilization to impair personnel efficiency indicates periods of heightened research activity followed by intervals of casual attention. Such accelerated R&D emphasis has occurred in response to battlefield illumination requirements, anti-aircraft personnel incapacitation, protection against atomic flash, pulsing light to produce confusion and disorientation, development of and protection against laser weapons, non-injurious systems for crowd and riot control, as well as in response to other aperiodic, urgent situations.

In the area of handheld projectile weapons we can specify the field requirements, turn to a data bank of ordnance R&D, and at least obtain a reasonable approximation of system specifications to meet the requirements. However, in the case of light energy and the incremental course of visual impairment, we do not have such a data bank. As a result, we are in a position of "fire fighting" as requirements arise or as the consequence of scientific breakthroughs, i.e., atomic energy, laser beams, retro-reflective optics, etc. The composition of the requirement is based upon a set of scenarios, each of which may have unique parameters, and dictates the type of approach which may be most feasible. For instance, typical field situations or scenarios for which light energy has been suggested as a means for personnel control are: non-lethal capture of military personnel or civil arrest of an individual; dazzling to permit automobile escape of potential kidnap victim; to thwart aircraft and truck highjacking; crowd and riot control; and, from the military point of view, the utilization of light energy to facilitate stopping moving vehicles by incapacitating the driver, neutralizing accurate fire power from a hostile bunker, disabling anti-aircraft tracking crews, prevention of barrier penetration to a secure area, and battlefield illumination. Each of these scenarios has been investigated as a unique problem or field requirement without

a systematic analysis of the similarities and differences. Often the response to the individual requirement covers the complete cycle from basic research to production. As a result, the process is lengthy, expensive, and frequently repetitive.

Much of the inefficiency with existing procedures would be reduced if a systems analysis program was undertaken which would provide a taxonomic base for diverse scenario requirements, approaches, equipment, acceptable risk, etc. For example, the ambient illumination within which incapacitation must be accomplished defines a minimum brightness which must be produced while the anatomical structure of the eye plus the risk of damage which the situation allows define the maximum brightness. The number of personnel involved together with the possible demand for concealment are important in the choice between pyrotechnic devices and optical devices. The wavelength of light emitted and the duration of intermittancy of exposure can be controlled to produce a variety of effects appropriate to the degree of risk one can assume in the continuum from dazzle to permanent retinal damage. Utilizing the systems approach, it should be possible to create a framework within which fragmentary advances can be preserved and structured so as to provide a basis for initiating responses to specific requirements on a timely basis.

As a first step an extensive sample of scenario requirements must be analyzed to identify significant parameters and combinations of parameters. This would be followed by a study of the various characteristics of light energy and techniques of uses as they apply to the scenario parametric classifications. Subsequent development would include consideration of physiological and psychological effects, equipment capabilities, countermeasures, system factors, and other variables which are identified as related to the selection of visual incapacitating approaches for defined requirements.

A visual impairment systems analysis as outlined above would not only be of major importance to diverse DOD elements, but would also provide required data and research guidelines for many specialized Governmental organizations such as the LEAA, FBI, CIA, Secret Service and civil law enforcement bodies which should be cognizant of systems for the protection or control of individuals and groups by means of light energy. Such a program would provide a matrix from which efficient and economical R&D programs could be generated (or perhaps not generated on the basis of the systems analysis information) in terms of the applications and requirements of specific Governmental organizations.

VISUAL INCAPACITATION SYSTEMS ANALYSIS*

I Potential Applications of Light Energy for Personnel Control	II Light Energy Physical Variables	III Visual System** Variables	IV Other System Factors	V Equipment State of Art	VI Recommendatic
----------	Wavelength	Recovery Time	User Risk	Pyrotechnic	Research Req.
----------	Intensity	Damage Risk	Emplacement	Electric Gas	Prototype Dev
----------	Duration	Possible	Reliability	Radiating Body	Test
----------	Rise Time	Temporary	Logistics	Laser	Evaluation
----------	Intermittent	Permanent	Covertness	Retroreflection	
----------	Flash Area	Component Affected		Size	
----------	Visual Angle	Lens Filming		Weight	
		Cornea Florescence		Power	
		Tear Ducts		Cost, etc.	
		Retina			
		Occipital Cortex			
		Disorientation			
		Pain			
		Occulomotor Spasm			

* This sequence or format for a systems analysis of visual impairment is not intended to be complete or even suggestive of the proper approach. Individuals experienced in the area of systems analysis and competent in the field of physical and physiological optics could undoubtedly structure a more appropriate experimental design.

** One of the major categories in a complete systems analysis should be some sort of a table, chart, or other type of clear presentation relating physiological visual impairment to performance efficiency. The word "impairment" only has significance in regard to the efficiency with which a hostile individual(s) can perform a specified task. Vision may be reduced to 20/400 on the Snellen Chart, but the individual can still shoot a human target at 50 feet. In other words, somewhere in the systems analysis light energy, physiological impairment and certain classes of task decrement must be related.